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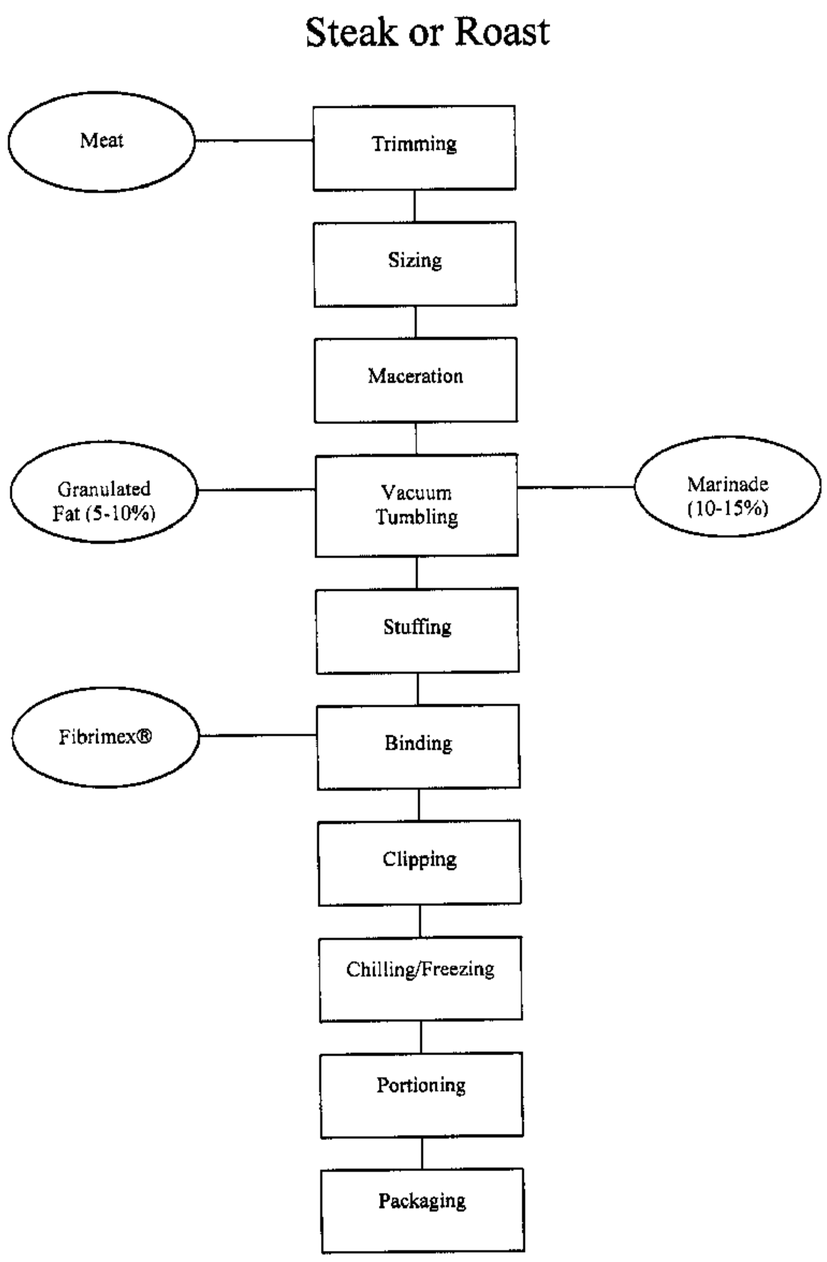
(54) Title: COMPOSITE MEAT PRODUCT AND METHOD FOR THE MANUFACTURE THEREOF



(57) Abrégé/Abstract:
A process for producing a composite meat product comprising:providing meat pieces suitable for inclusion in a composite meat product;binding the meat pieces together using a cold set binder and prior to the step of binding (a) macerating the meat pieces, (b) marinading the meat pieces, (c) adding fat to the meat pieces or (d) any combination of steps (a) to (c).

Abstract of the invention

A process for producing a composite meat product comprising:providing meat pieces suitable for inclusion in a composite meat product;binding the meat pieces together using a cold set binder and prior to the step of binding (a) macerating the meat pieces, (b) marinading the meat pieces, (c) adding fat to the meat pieces or (d) any combination of steps (a) to (c).

Composite Meat Product And Method For The Manufacture Thereof

Introduction

The invention relates to a composite meat product consisting of meat muscles which are bonded to each other by means of a cold set meat binder. The invention also relates to a method for the manufacture of composite meat products in which raw meat muscles are processed by a method including at least one of tenderizing, marinating or adding fat. The process further includes mixing the raw meat muscles with a cold set meat binder and forming the meat into a composite product of desired shape. Some of the processing steps are known in several segments of the meat industry but are not yet commonly practiced in above combination for whole muscle meat processing. A high grade composite product can be made from undervalued meat muscles which would typically have been used for low valued ground meat.

Advantages of composite (cold-set) meat products are numerous and include:

- New products – consumer-oriented, varying shapes, form and size possible, increased convenience in preparation and cooking
- Portion control – yields on new products higher due to exact portion control, retail and food service industry advantages
- Value-adding – simulate high-end full muscle products utilizing under valued muscles and off-cuts, profits for the manufacturer due to higher overall carcass yields

Description

Following is an in-depth description of a manufacturing process of composite meat products according to the present invention. The process includes trimming and sizingthe meat, stuffing the meat into a form, binding the meat pieces together and preparing the resultant composite meat product for sale. The process according to the present invention further includes, prior to stuffing, at least one of maceration, marinating and addition of fat. Figure 1 shows a preferred method of processing.

Trimming and Sizing

Meat is trimmed of excessive fat and sinew. Trimming of this fat and removal of the sinew allows for consistency of bite and appearance throughout the final composite product. Fresh meat is suggested for optimum binding results however previously frozen meat can also be successfully used. Meat muscles are cut into smaller pieces to facilitate moisture pickup and ease of processing. Pieces are in general sized to a range of 1"x1"x½" to 6"x6"x4" with preferred piece sizes of 4" x 2" x 1".

Maceration

Maceration or mechanical tenderizing is the process in which meat muscle fibers are cut into shorter lengths to obtain a homogenous and a more tender composite product. Tough muscles such as hip or chuck meat can be tenderized to obtain a 'steak' bite and can be utilized for steaks or roasts. Mechanical tenderizing takes place with equipment that has rotating knifes through which meat muscles pass. Depending on the number of passes, direction of tenderizing, depth of the cut, and distance between the blades, the meat muscle fiber is cut shorter and results in a more tender and an overall more consistent product. In particular beef cuts from the shoulder and hip require more then one pass through the tenderizer whereas pork meat seldom requires tenderizing or at most one single pass. Poultry products do not require mechanical tenderizing for consistency of bite or for toughness.

Marinating and Vacuum Tumbling

The following process step is used to increase the moisture content and juiciness of the finished product through moisture enhancement using a vacuum tumbler. Meat is placed in a rotating vacuum tumbler and marinade is added. Tumbling (under vacuum) allows for complete absorption of the liquid into the meat interior. A moisture pick-up of 15% w/w based upon the green (or trimmed, not marinated) weight of the meat, is preferred as it provides maximum juiciness while maintaining the appropriate natural texture of the meat. While 15% is preferred, moisture pickup can be selected as 5% to 40%. Higher moisture pickup provides substantial economical advantages for the manufacturer as the resultant meat product contains higher concentrations of water. The marinade is made up of water and small amounts of phosphate, salt, sugar and may contain an antioxidant or anti-microbial. Phosphate and salt added to the marinade perform the function of

improving the moisture retention capacity of the meat. The levels range from 0.1-0.6% w/w for phosphate and 0.1-1.0% w/w for salt. At the preferred levels of 0.45% w/w sodium tri-polyphosphate and 0.8% w/w salt (NaCl) a natural meat flavor is maintained, while providing a juicy whole-muscle texture. Sugar or preferably multiple sugars such as corn syrup solids mask the saltiness when used in ranges of 0.05% to 0.6% w/w. Any weak (food grade) acid such as citric acid or ascorbic acid can be used as an anti-oxidant. The preferred compound is sodium bicarbonate due to its additional ability to increase pH level and have a positive effect on the binding of the composite meat product. Tumble times vary with type of tumbler, meat cut and piece size and may range from 5 min to 45 minutes. Lengthy tumbling times should be avoided as this will result in protein extraction. This could interfere with the adhesive properties of the cold set binder, diminishing the visual appearance of the composite product when sliced and creating a denatured meat protein thus producing an inferior quality product. Although the intent of the marinating is not to flavor the meat, but to enhance the moisture retention capacity of the product as well as maintain the flavor of the meat, it can also be means for adjusting the flavor profile of the meat by adding specific flavoring agents.

Addition of Fat

Integrating fat into the meat structure increases natural flavor and juiciness of the finished product. Powdered fat can be applied directly into the meat using a vacuum tumbler or can be aggressively blended into the marinade and then applied onto the meat using vacuum tumbling. Under this invention a procedure is developed for the production of fine fat granules. Fat trimmings are frozen and run through a grinder using a coarse plate. The small particles are kept frozen and chopped in a bowl cutter while adding dry ice pellets or snow. Approximately 1/2 – 1 lbs dry ice is used per 1 lbs of fat particles. The chopping is done at high speed until a fine powder is produced. This powder can be stored in a freezer until time for use. Fat can also be applied to a composite product by adhering a sheet of fat to the external surface of a composite product thus simulating a natural fat cap on the meat. Under this invention a procedure was developed for the preparation and application of sheet fat to composite meat product. A sheet of fat is prepared from a large fat strip by removing all meat and trimming the layer to a desired thickness, width and length. The prepared fat caps can be stored frozen but require

thawing prior binding. The application of the fat cap to the meat is described under the binding section. Fat, both granular and sheet fat can be added in any amount. For optimal flavor, texture and binding 5-12 % w/w granulated fat is preferred (based on green weight).

Binding and Stuffing

After pre-processing the meat parts can be bonded into a composite product. There are several cold set binders commercially available for binding meat parts into a composite product. 'Cold set binder' refers to the ability of a binder to bind pieces of meat without the requirement for salt, phosphates, freezing or high temperatures (such as cooking) to establish binding between meat parts. The preferred binder is a solution containing the proteins fibrinogen and thrombin. The solution used contains at least fibrinogen in a concentration of 10 mg/ml and a catalytic quantity of thrombin. The protein solution also contains catalytic quantities of transaminase (fibrin-stabilizing factor or blood clotting factor XIII) and calcium ions in order to obtain a good bonding of the raw meat parts. The fibrin-stabilizing factor effects, in the presence of calcium ions, a linking of fibrin molecules among themselves and of fibrin to collagen molecules in the meat, as a result of which a stronger gel is produced and a good bonding is promoted. The protein solution may be a solution of fibrinogen and thrombin in water, salt solution or buffer. It is advantageous to use a blood plasma derived protein solution with a fibrinogen concentration increased to at least 10 mg/ml such as that known as Fibrimex® available from Harimex Inc. To the protein solution a catalytic quantity of the enzyme thrombin is added. The meat parts are mixed with the protein solution and the whole can be arbitrarily shaped. The bonding proceeds more rapidly, the higher the thrombin concentration.

In general the bonding process may be performed at temperatures above freezing point to 55°C using fresh or previously frozen meat parts.

Other cold set binders are also useful such as those known as Protanal® (Pronova Biopolymer, USA), Pearl Meat (Chiba Flour Milling Company Ltd, Japan) and Activa (Ajinomoto, Japan). Protonal is based on sodium alginate and is combined with calcium carbonate and an organic acid before applied to the surface of meat pieces. Eighteen

hours of storage is required for adequate binding strength to develop. The composite product can be sliced fresh or frozen.

The Pearl meat binder is a mixture of egg white, casin, lactalbumin, gelatin, soya protein, wheat protein, bone powder and egg shell. The powder is applied onto the meat muscles and directly after application is pressed into a form or mold. The bonding will be complete within 30 minutes to one hour and the composite product can be sliced after freezing. Activa contains sodium caseinate, maltodextrin and a catalytic compound transglutaminase. The powder can be applied directly over the meat parts or dissolved first in water and then mixed with meat parts. The meat parts are pressed into a desired shape or form and allowed to set up binding.

Some preparation can be required in the use of these binders such as thawing or blending of ingredients. The binder can be blended, injected or tumbled into the meat parts. After coating of the meat parts product is placed into a desired shape or form and allowed to set for a period of time to allow the bonding to take place. The composite meat product can be sliced fresh or cut frozen. Storage and distribution follow either the fresh or frozen channel. Above process is applicable for any meat species and includes beef, pork, poultry, seafood and fish.

The meat pieces are held together such that they bind. This process is commonly termed stuffing. Stuffing can be done before or after application of the cold set binder. A vacuum stuffer in which meat parts are pumped under vacuum into a device (Fibri-meat-System, Harimex Inc.) that injects the protein solution and coats the meat muscles can be used for higher volume processing. An automatic portioner (Poly-Clipper, PolyClip Inc.) placed after the injection and mixing unit allows for product to be portioned into casings. A tight ring is clipped around the casing and separates one portion from another. The casing product can be formed in any desired shape. Thereafter the composite meat product is allowed to bind and then is prepared for sale.

Example I Beef Steak (from pectoral muscle)

Granulated beef fat was produced by trimming the excess meat off beef fat caps from the primal seven-bone rib (to a 1/4 " thick), frozen and grinding (3mm coarse plate) the caps into small particles with a grinder (K&G Wetter). The particles were frozen and run through a silent cutter (Sydelmann) at speed III while adding dry ice pellets until a very fine powder was obtained. The following ratio dry ice to fat was used: ¾ lbs : 1 lbs. The fat powder was stored in the freezer until use in the marinade.

Fresh pectoral meat was trimmed of all excessive fat and sinew (trimming loss 6% w/w) and then cut into fist-sized pieces, approximately 2" x 4" x 1". The meat pieces were run through a Biro Sir Steak Tenderizer, with a 10 mm cut depth and 8 mm width between the cuts. The meat muscle is passed through the tenderizer with one pass with the grain and one pass across the grain of the muscle. Immediately after tenderizing the pectoral pieces were placed in a vacuum tumbler and marinade was added. The marinade was beforehand prepared by dissolving 0.4 % (based on finished weight meat and marinade) sodium tri-polyphosphate into 11.44 % water, subsequently by dissolving 0.3 % corn syrup solids, 0.7 % salt and 0.2 % sodium-bicarbonate into the water-phosphate solution. After weighing the desired amount of marinade 6% w/w granulated fat (based on finished weight meat and marinade) was blended into the marinade with a high speed blender. The mixture containing the marinade and fat was added to the meat and vacuum tumbled under 0.85 bar vacuum for 10 minutes at 8 RPM.

Fibrinogen and thrombin was thawed for 1 ½ hrs using running water of 80-85°F. A mixture of fibrinogen and thrombin in a 10:1 ratio was used for bonding the above named meat parts. Five % w/w of the mixture was applied to the surface of the meat muscles and transferred within 5 minutes to an Aligned Grain Stuffer (AGS, Harimex Inc, Canada). The meat parts were stuffed into 5 ¼ " perforated casing, slack-filled, clipped and placed on racks. Another method of forming is to take the meat coated with Fibrimex® and portion it into a rollstock packaging machine. The pouches on the rollstock machine are set at a 3" depth and 5 x 7" dimension. After the meat is placed in the pouches a trimmed and sized fat cap is placed on top of the meat. The portion is then run through the rollstock machine, vacuum sealed and placed on racks. The whole was

set aside (casings and pouches) for a night in a cooled room (0°C to 4°C) in order to obtain a good gel and bonding. The composite and shaped product was removed on the following day from the casings and pouches and cut into slices of ¾ " thickness, resembling a rib-eye steak (casing product) and striploin steak (pouch product). The bonding in these slices was sufficiently strong and stable for further processing as a fresh meat product.

Example 2 Center Cut Pork Chop (from cushion meat)

Fresh boneless cushions were cut into fist sized pieces, approximately 2" x 4" x 1". The meat pieces were run through a macerator, single pass and random direction. The cushion meat was marinated with 15% basic marinade or on finished weight 11.44 % water, 0.4 % tri-polyphosphate, 0.7 % corn syrup solids and 0.2 % sodium-bicarbonate prepared as described in example 1. The meat product was vacuum tumbled vacuum for 10 minutes under 21 inch Hg and at 8 rpm. The marinated product was transferred from the tumbler to a vacuum stuffer (Reiser, DP-10C) and pumped through a static mixer where in the inlet two components, fibrinogen and thrombin were injected. The mixture of the fibrinogen and thrombin were applied over the meat surfaces through the working of the 3-pass static mixer. Both injection and mixing actions of the Fibrimex® were provided with a system developed specifically for the application of Fibrimex® called Fibri-Meat-System (Harimex Inc, Canada). After coating of the meat pieces the meat flow continued into a forming and shaping device, Double Clipper (PolyClip, USA). Where meat was stuffed into casings, slack filled and clipped into logs of about 30" long. The logs were placed on trays and allowed to setup binding for 2 hours in a cooled room, 0°C to 4°C. Then the meat was crusted by running it through a CO2-freezing tunnel. The logs could be cut using an AEW slicer into ¾ " thick slices. The slices were individually packaged using a MultiVac packaging system and frozen. Product was consumer ready and could be cooked from frozen or thawed state. The binding in these slices were also sufficiently strong and stable and could be handled as can be expected from whole muscle pork chops.

Formed Shrimp (from Bangladesh shrimp)

Example 3

Previously frozen shrimp from Bangladesh origin (not pre-soaked or treated with phosphate) were drained of purge. The shrimps were run through a maccrator, single pass and random direction. The shrimp were then marinated with 15 % w/w basic marinade or on finished weight 11.44 % water, 0.4 % tri-polyphosphate, 0.7 % corn syrup solids and 0.2 % sodium-bicarbonate prepared as described in example 1. The shrimp product was tumbled under vacuum for 10 minutes under 21 inch Hg and at 8 rpm. The product was transferred to sheet trays in layers of 1" thick and placed in a CO2 blast freezer. The product was frozen to –4 degree C and allowed to temper for ½ hour to a consistent temperature of –2 degree C. The tempered product was transferred to a blender and a mixture of fibrinogen and thrombin in a 10:1 ratio (total 6% w/w) was added. The protein solution was mixed through the shrimp, dumped into a vacuum stuffer (Handtmann VF200) and quickly processed. A mold with a distinct shrimp shape was attached at the outlet pipe of the stuffer and an aggressive cut-off device driven by the stuffer allowed portioning of the shrimp product that was pumped by the stuffer through the mold and portioner. The formed shrimp were placed on trays, individually quickly frozen (IQF) and packaged. The shrimp could be cooked from frozen or thawed state and would perform as one bonded product.

achieve

or as necessary

less than -0.5 °C and preferably

-0.5 to -4.0 °C and preferably.

Claims:

1. A process for producing a composite meat product comprising:
providing meat pieces suitable for inclusion in a composite meat product;
binding the meat pieces together using a cold set binder and prior to the step of binding (a) macerating the meat pieces, (b) marinading the meat pieces, (c) adding fat to the meat pieces or (d) any combination of steps (a) to (c).

Fibrimex® Product Concepts

Harimex, Inc.
a Sobel Company

Steak or Roast

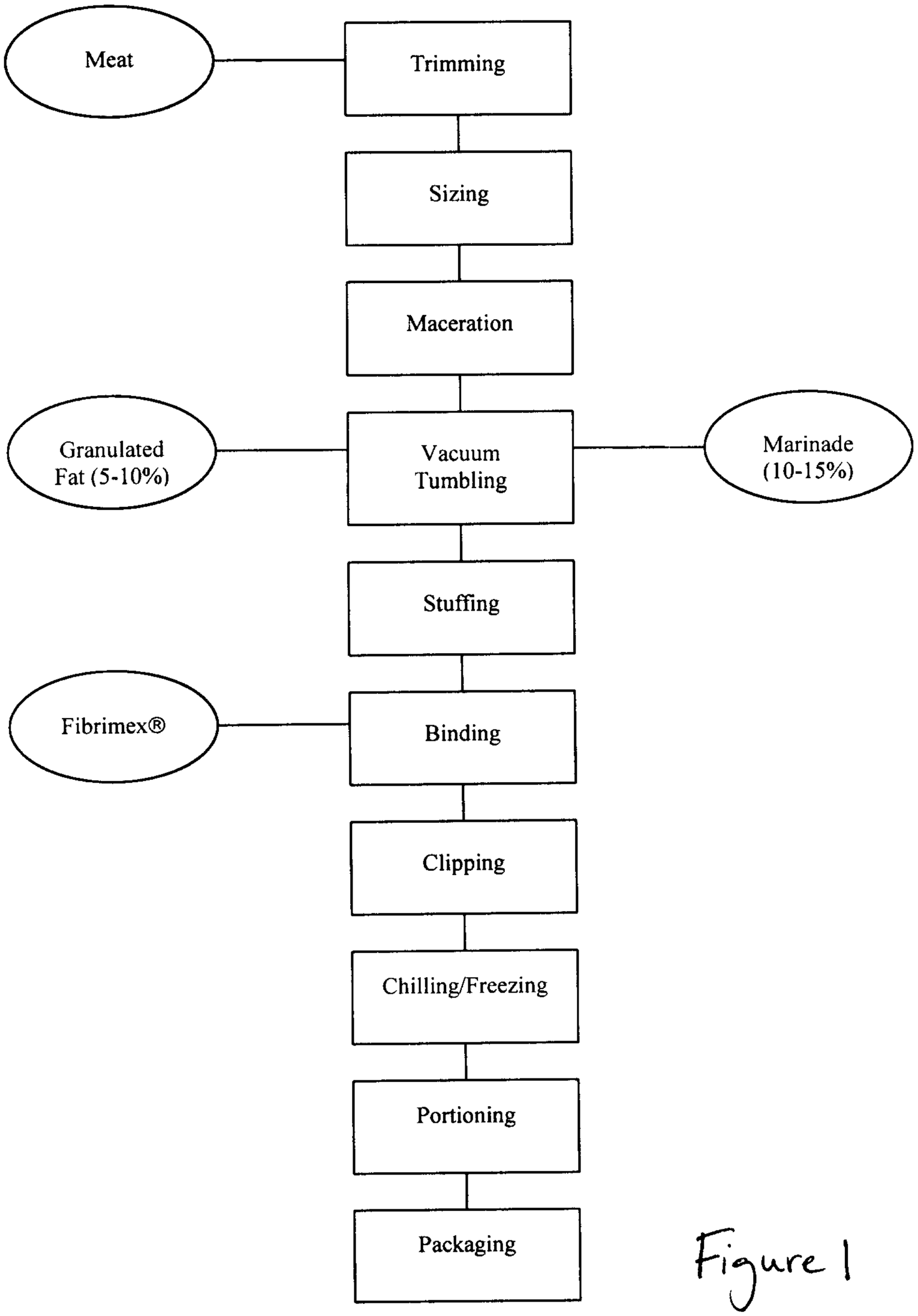


Figure 1

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